Approaches to Developing State-Level Rates for Children's Health Care Quality Measures Based on Data from Multiple Sources

Background

Guided by the Children's Health Insurance Program Reauthorization Act (CHIPRA), the Centers for Medicare & Medicaid Services (CMS) intends for the initial core set of children's health care quality measures to provide a national- and State-level snapshot of the quality of care provided to children enrolled in Medicaid and the Children's Health Insurance Program (CHIP). In many States, data for the core measures are collected and reported separately by multiple entities, such as program (Medicaid or CHIP); payment system (for example, fee-for-service [FFS], primary care case management [PCCM], or managed care [MC]); health plan; or provider. We refer to each of these entities as *reporting units*. In such cases, States would have to aggregate separate rates across multiple reporting units to produce a single State-level rate that represents the quality of children's health care, regardless of the program in which they are enrolled, the system used to pay for their care, or the health plans or providers that serve them.

As noted in the *Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting* (CMS 2011):

> The reporting unit for each measure is the State as a whole. This means that States reporting any of the core measures should collect data across all of the health care delivery systems used in their State Medicaid and CHIP programs (FFS, PCCM, or MC). States must aggregate data from all these sources into one State rate before reporting the data to CMS.

Depending on how a State organizes its Medicaid and CHIP programs, there could be many variations in the number and kinds of reporting units that can contribute to a State-level rate. For example, a State that enrolls all of its children in a FFS delivery system may calculate performance measures across its entire Medicaid/CHIP population, yielding a single, State-level rate. In other States, however, Medicaid and CHIP programs might collect data separately, and their data would have to be combined across programs to produce a State-level rate. Moreover, within a Medicaid or CHIP program, data might have to be combined across different payment systems such as FFS and MC. Similarly, if multiple managed care plans deliver care, each might report a separate rate, requiring aggregation of rates across plans to obtain a State-level rate. However, the principles and general approach for aggregating the data are the same, regardless of the type or number of reporting units across which the data are aggregated.

The specific steps used to develop a State-level rate vary according to the data sources and method used to calculate a measure:

About This Brief

The purpose of this technical assistance brief is to assist States in aggregating separate rates for the initial core set of children's health care quality measures across multiple reporting units to produce a single State-level rate that represents the quality of children's health care regardless of the program in which they are enrolled, the system used to pay for their care, or the health plans or providers that serve them. Separate rates may be calculated by program (Medicaid or CHIP); payment system (for example, fee-for-service [FFS], primary care case management [PCCM], or managed care [MC]); health plan; or provider. This brief also discusses how aggregated rates should be reported in the CHIP Annual Reporting Template System (CARTS), potential cautions about calculating and interpreting aggregated rates to measure children's health care quality, and sources of further information.

- The administrative method calculates a rate based on the *entire* eligible population for the measure using administrative data, primarily claims and encounter data.

- The hybrid method calculates a rate based on a *sample* of the eligible population for the measure using a combination of administrative data augmented by a review of medical records.

Of the 24 measures included in the initial core set, 9 specify the administrative method and 10 can be calculated using either the administrative or hybrid method; the remaining 5 rely on other data sources, such as beneficiary surveys and state vital records. Appendix A shows the 24 initial core set measures and the data sources used for each. This brief focuses on the 19 measures constructed using administrative and/or hybrid methods.

Data Sources and Methods for Calculating State-Level Rates

Data Sources

- **Administrative data** are transaction data from claims, encounters, or other administrative sources, such as registries.

- **Medical records data** are data obtained through a review of medical records.

Methods

- The **administrative method** requires the identification of the denominator (that is, the measure's eligible population) and the numerator using transaction data or other administrative databases. The rate is calculated based on *all members* who meet the eligible population criteria (after optional exclusions, if applicable) and who are found through administrative data to have received the service required for the numerator.

- The **hybrid method** requires the use of both administrative and medical records data to look for the service required for the numerator. The denominator consists of a *systematic sample of members* drawn from the measure's eligible population. The rate is calculated based on cases in the sample found through either administrative or medical records data to have received the service required for the numerator.

Creating State-Level Rates Across Multiple Reporting Units Using the Administrative Method

For the initial core set measures that rely on administrative data sources exclusively, the rates are calculated for the *entire* eligible population as defined in the measure specifications. In this context, the term *eligible population* refers to the population included in the measure (that is, the denominator). The eligible population for each measure is defined in the technical specifications for the initial core set measures (CMS 2011).

When data reside in independent administrative data systems, separate numerators, denominators, and rates may first be calculated by the reporting unit (such as program, provider, or health plan). In these situations, the aggregation of data across reporting units is straightforward. So long as the reporting units are mutually exclusive, each reporting unit for which the measure is calculated contributes proportionately to the State-level rate, and no further weighting of results is required because the reporting unit's denominator is the same as its eligible population for that measure. Table 1 shows an example for four reporting units (such as four health plans), in which rates can be combined by summing the denominators (column 2) and individual numerators (column 3) to produce a State-level rate (column 4). In this example, the rate across the four reporting units is 72 percent (= 241,000/335,000).

Table 1. Combining Administrative Method Results Across Multiple Reporting Units

Reporting Unit	Denominator	Numerator	Rate
A	10,000	8,000	80%
B	25,000	15,000	60%
C	100,000	70,000	70%
D	200,000	148,000	74%
State-Level Total	335,000	241,000	72%

Creating State-Level Rates Across Multiple Reporting Units Using the Hybrid Method

Other measures in the initial core set use the hybrid method to calculate results for a *sample* of the eligible population (see Appendix A). The hybrid method uses a combination of administrative and medical records data. When separate samples are drawn and individual rates are calculated by different reporting units—such as individual programs (Medicaid and separate CHIP programs) and/or individual health plans—the State-level

rate is the average of the rates for each of the reporting units, weighted by the eligible population for each of those units.

For each reporting unit, the sample size is the denominator of the measure. For every case in the sample, administrative data are used to find evidence of the numerator service, such as a well-child visit or an immunization. For cases in the sample in which the administrative data do not yield evidence of the numerator service, the medical records are then searched for evidence of the service. The numerator events found through administrative data and medical record review are added to form the numerator for the measure. The rate for the reporting unit is the numerator divided by the denominator (the sample size).

To combine rates calculated using the hybrid method across multiple reporting units, the rates must be weighted by the eligible population for each of the units (referred to as the *measure-eligible population*). State-level rates are produced using the following steps, as illustrated in Table 2:

1. Sum the measure-eligible population across the reporting units to derive a State-level total (column 2).

2. Divide each reporting unit's measure-eligible population by this sum to get the weight for each reporting unit (column 3). For example, the weight for reporting unit A is 10,000/335,000 = 0.0299.

3. Multiply the rate for each reporting unit (column 6) by its corresponding weight (column 3) to get the weighted rate (column 7).

4. Sum the weighted rates across all reporting units to get the weighted State-level rate. In this example, the weighted State-level rate is 72 percent.

Creating State-Level Rates Across Multiple Reporting Units Using a Combination of Administrative and Hybrid Methods

States might have to combine rates developed using the administrative method for some reporting units and the hybrid method for others. For example, in a State that has both FFS and MC delivery systems, the FFS rate may be calculated using the administrative method and the MC rate may be calculated using the hybrid method. The approach used to aggregate results across reporting units in which some use the administrative method and others use the hybrid method is similar to that shown in Table 2. In both cases, the State-level rate is the average of the rates for each of the reporting units weighted by the eligible population for each of those units. The only difference is how the individual reporting units arrived at their rates.

Table 3 demonstrates how to combine rates calculated using different methods. For rates calculated using the administrative method (reporting units A and C), the measure-eligible population (column 2) and denominator (column 4) are the same. In contrast, for rates calculated using the hybrid method (reporting units B and D), the measure-eligible population (column 2) and denominator (column 4) differ because the denominator reflects the sample size. Thus, the numerators and denominators for the two reporting units using administrative data (A and C) are larger than those for the other two reporting units that use a sample (B and D). However, the weight (column 3) applied to the rate (column 6) is still the proportion of the measure-eligible population to the total measure-eligible population in the State, and the State-level rate shown in column 7 is the sum of the weighted rates across reporting units.

Table 2. Combining Rates Calculated Using the Hybrid Method Across Multiple Reporting Units

Reporting Unit	Measure-Eligible Population	Weight[a]	Denominator (Sample Size)	Numerator	Rate[b]	Weighted Rate[c]
A	10,000	0.0299	411	329	80%	2.4%
B	25,000	0.0746	411	247	60%	4.5%
C	100,000	0.2985	411	288	70%	20.9%
D	200,000	0.5970	411	304	74%	44.2%
State-Level Total	335,000	1.0000	n.a.	n.a.	n.a.	**72.0%**

[a] The weight is calculated by dividing the measure-eligible population for each reporting unit by the State-level total eligible population; for example, the weight for reporting unit A is calculated as 10,000/335,000 = 0.0299.

[b] The rate is calculated by dividing the numerator by the denominator for each reporting unit; for example, the rate for reporting unit A is calculated as 329/411 = 0.80 or 80 percent.

[c] The weighted rate is calculated by multiplying the weight and rate for each reporting unit; for example, the weighted rate for reporting unit A is calculated as 0.0299 x 0.80 = 0.024 or 2.4 percent.

n.a. = not applicable.

Table 3. Combining Results Calculated Using Both Administrative and Hybrid Methods Across Multiple Reporting Units

Reporting Unit (Method)	Measure-Eligible Population	Weight[a]	Denominator (Total or Sample Size)	Numerator	Rate[b]	Weighted Rate[c]
A (Admin.)	10,000	0.0299	10,000	8,000	80%	2.4%
B (Hybrid)	25,000	0.0746	411	247	60%	4.5%
C (Admin.)	100,000	0.2985	100,000	70,000	70%	20.9%
D (Hybrid)	200,000	0.5970	411	304	74%	44.2%
State-Level Total	335,000	1.0000	n.a.	n.a.	n.a.	**72.0%**

Note: In column 4, the denominator shown for reporting units A and C is the measure-eligible population, whereas the denominator for reporting units B and D is the sample size. The measure-eligible population is shown for reporting units using administrative data to calculate the rate, whereas the sample size is shown for reporting units using the hybrid method.

[a] The weight is calculated by dividing the measure-eligible population for each reporting unit by the State-level total population; for example, the weight for reporting unit A is calculated as 10,000/335,000 = 0.0299.

[b] The rate is calculated by dividing the numerator by the denominator for each reporting unit; for example, the rate for reporting unit A is calculated as 8,000/10,000 = 0.80 or 80 percent.

[c] The weighted rate is calculated by multiplying the weight and rate for each reporting unit; for example, the weighted rate for reporting unit A is calculated as 0.0299 x 0.80 = 0.024 or 2.4 percent.

n.a. = not applicable.

Reporting State-Level Rates in CARTS

CARTS allows States to report a single numerator, denominator, and rate for each measure. Reporting a single numerator and denominator value is possible when: (1) there is a single sample for the entire State, regardless of the method used to calculate the rate, or (2) the State has combined multiple rates that were derived using the administrative method. However, when a State combines data across multiple reporting units, all or some of which use the hybrid method (such as the examples shown in Tables 2 and 3), the State should enter zeroes in the "Numerator" and "Denominator" fields. In these cases, it should report the State-level rate in the "Rate" field and, when possible, include individual reporting unit numerators, denominators, and rates in the field labeled "Additional Notes on Measure," along with a description of the method used to derive the State-level rate.

Caveats About State-Level Rates Involving Multiple Reporting Units

Calculating measures across multiple reporting units is more complex than calculating measures for a single reporting unit. Combining data across programs, payment systems, health plans, or providers can introduce several issues that might affect the rates. For example, methods can vary (even when following the same specifications) and introduce inconsistencies in how the rates are produced across reporting units. In other instances, some children may be excluded inadvertently (such as those transferring between programs or health plans), and some can even be double-counted, depending on how the eligible population is specified. To minimize the effect of these issues, children should be attributed to the program in which they were enrolled at the end of the continuous enrollment period, or on the date of the qualifying event (such as their second birthday or delivery date of a newborn). States should note any deviations from the measure specifications in the CARTS reports submitted to CMS.

States should also be aware that results can vary depending on the source of data used. Research has shown that, for measures in which either the administrative or the hybrid method can be used, rates calculated using administrative data are often lower than rates calculated using both administrative and medical records data. This is because services often are not consistently or completely coded in claims/encounter data and because it is difficult to identify relevant exclusions that are apparent in the medical record but not coded in administrative data (Pawlson et al. 2007).

For Further Information

Background information on the initial core set of children's health care quality measures, guidance for collecting and reporting the measures, and technical specifications for each measure can be found in the Initial Core Set of Children's Health Care Quality Measures: Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting (CMS 2011). To obtain a CARTS user name and password, contact Shambrekia Wise (Shambrekia.Wise@cms.hhs.gov). For assistance using CARTS, contact Jeffrey Silverman (Jeffrey.Silverman@cms.hhs.gov). For technical assistance related to calculating and reporting State-level rates or other measurement-related topics, contact the technical assistance mailbox at CHIPRAQualityTA@cms.hhs.gov.

References

Centers for Medicare & Medicaid Services, Center for Medicaid and CHIP Services. "Initial Core Set of Children's Health Care Quality Measures: Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting." Baltimore, MD: CMS, December 2011. (Available at http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/Downloads/InitialCoreSetRe-souceManual.pdf)

Pawlson, G., Sarah Hudson Scholle, and Anne Powers. "Comparison of Administrative-Only Versus Administrative Plus Chart Review Data for Reporting HEDIS Hybrid Measures." *American Journal of Managed Care,* vol. 13, no. 10, October 2007, pp. 91–96.

Appendix A

Initial Core Set of Children's Health Care Quality Measures

	Measure	Description	Data Source
1	Timeliness of Prenatal Care	Percentage of deliveries of live births between November 6 of the year prior to the measurement year and November 5 of the measurement year that received a prenatal care visit in the first trimester or within 42 days of enrollment	Administrative or hybrid
2	Frequency of Ongoing Prenatal Care	Percentage of deliveries between November 6 of the year prior to the measurement year and November 5 of the measurement year that received the following number of expected prenatal visits: < 21 percent of expected visits, 21 percent – 40 percent of expected visits, 41 percent – 60 percent of expected visits, 61 percent – 80 percent of expected visits, or ≥ 81 percent of expected visits	Administrative or hybrid
3	Percentage of Live Births Weighing Less Than 2,500 Grams	Percentage of live births that weighed less than 2,500 grams in the State during the reporting period	State vital records
4	Cesarean Rate for Nulliparous Singleton Vertex	Percentage of women that had a cesarean section among women with first live singleton births (also known as nulliparous term singleton vertex [NTSV] births) at 37 weeks of gestation or later	State vital records alone or merged with discharge diagnosis data
5	Childhood Immunization Status	Percentage of children that turned 2 years old during the measurement year and had specific vaccines by their second birthday	Administrative or hybrid
6	Adolescent Immunization Status	Percentage of adolescents that turned 13 years old during the measurement year and had specific vaccines by their 13th birthday	Administrative or hybrid
7	Body Mass Index Assessment for Children/ Adolescents	Percentage of children ages 3 to 17 that had an outpatient visit with a primary care practitioner (PCP) or obstetrician/gynecologist (OB/GYN) and whose weight is classified based on body mass index percentile for age and gender	Administrative or hybrid
8	Developmental Screening In the First Three Years of Life	Percentage of children screened for risk of developmental, behavioral, and social delays using a standardized screening tool in the 12 months preceding their first, second, or third birthday	Administrative or hybrid
9	Chlamydia Screening	Percentage of women ages 16 to 20 that were identified as sexually active and had at least one test for chlamydia during the measurement year	Administrative
10	Well-Child Visits in the First 15 Months of Life	Percentage of children that turned 15 months old during the measurement year and had zero, one, two, three, four, five, or six or more well-child visits with a primary care practitioner (PCP) during their first 15 months of life	Administrative or hybrid
11	Well-Child Visits in the 3rd, 4th, 5th, and 6th Years of Life	Percentage of children ages 3 to 6 that had one or more well-child visits with a primary care practitioner during the measurement year	Administrative or hybrid
12	Adolescent Well-Care Visit	Percentage of adolescents ages 12 to 21 that had at least one comprehensive well-care visit with a primary care practitioner or an obstetrical/gynecological (OB/GYN) practitioner during the measurement year	Administrative or hybrid
13	Percentage of Eligibles That Received Preventive Dental Services	Percentage of individuals ages 1 to 20 eligible for Medicaid or CHIP Medicaid Expansion programs (that is, individuals eligible for EPSDT services) that received preventive dental services	Administrative
14	Child and Adolescent Access to Primary Care Practitioners	Percentage of children and adolescents ages 12 months to 19 years that had a visit with a primary care practitioner (PCP)	Administrative
15	Appropriate Testing for Children with Pharyngitis	Percentage of children ages 2 to 18 that were diagnosed with pharyngitis, dispensed an antibiotic, and received a group A streptococcus test for the episode	Administrative
16	Otitis Media with Effusion (OME) – Avoidance of Inappropriate Use of Systemic Antimicrobials in Children	Percentage of children ages 2 months to 12 years with a diagnosis of otitis media with effusion (OME) that were not prescribed systemic antimicrobials	Administrative or electronic health record
17	Percentage of Eligibles that Received Dental Treatment Services	Percentage of individuals ages 1 to 20 eligible for Medicaid or CHIP Medicaid Expansion programs (that is, individuals eligible for EPSDT services) that received dental treatment services	Administrative

18	Ambulatory Care – Emergency Department (ED) Visits	Rate of ED visits per 1,000 member months among children up to age 19	Administrative
19	Pediatric Central Line-Associated Blood Stream Infections	Rate of central line-associated blood stream infections (CLABSI) in the pediatric and neonatal intensive care units during periods selected for surveillance	Medical records
20	Annual Percentage of Asthma Patients 2 Through 20 Years Old with One or More Asthma-Related Emergency Room Visits	Percentage of children ages 2 to 20 diagnosed with asthma during the measurement year with one or more asthma-related emergency room (ER) visits	Administrative
21	Follow-Up Care for Children Prescribed Attention Deficit Hyperactivity Disorder (ADHD) Medication	Percentage of children newly prescribed ADHD medication that had at least three follow-up care visits within a 10-month period, one of which was within 30 days from the time the first ADHD medication was dispensed, including two rates: one for the initiation phase and one for the continuation and maintenance phase	Administrative
22	Annual Pediatric Hemoglobin A1C Testing	Percentage of children ages 5 to 17 with diabetes (type 1 and type 2) that had a hemoglobin A1c (HbA1c) test during the measurement year	Administrative or hybrid
23	Follow-Up After Hospitalization for Mental Illness	Percentage of discharges for children ages 6 to 20 that were hospitalized for treatment of selected mental health disorders and who had an outpatient visit, an intensive outpatient encounter, or partial hospitalization with a mental health practitioner within 7 days of discharge and within 30 days of discharge	Administrative
24	Consumer Assessment of Healthcare Providers and Systems® (CAHPS) 4.0	Survey on parents' experiences with their children's care	Survey